

12/2/16

"Our greatest weakness lies in giving up. The most certain way to succeed is always to try just one more time." -Thomas Edison

HW: Worksheet "Solving Rational Inequalities" #3, 5, 7, 9\*

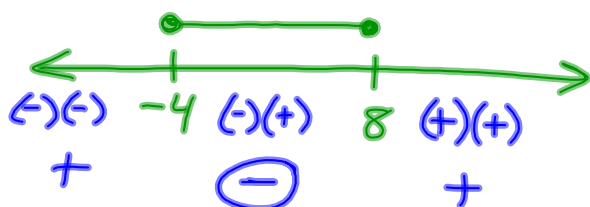
AIM: How do we solve Rational Inequalities?

Warm Up:

1. Solve by completing the square:  $3x^2 + 20x + 36 = 4$

$$\begin{aligned}
 & \frac{3x^2 + 20x + 36}{-36 \quad -36} = \frac{-32}{3} \\
 & \frac{3x^2}{3} + \frac{20x}{3} = \frac{-32}{3} \\
 & x^2 + \frac{20}{3}x + \boxed{\frac{100}{9}} = \frac{-32}{3} + \boxed{\frac{100}{9}} \quad \frac{-32}{3} = \frac{-96}{9} + \frac{100}{9} = \frac{4}{9} \\
 & \left( \frac{20}{3} \right) \div 2 = \frac{20}{6} = \frac{10}{3} \quad \left( \frac{10}{3} \right)^2 = \frac{100}{9} \\
 & \left( x + \frac{10}{3} \right)^2 = \pm \sqrt{\frac{4}{9}} \\
 & x + \frac{10}{3} = \pm \frac{2}{3} \\
 & x = -\frac{10}{3} \pm \frac{2}{3} \\
 & \quad \quad \quad -\frac{10}{3} + \frac{2}{3} = \left( -\frac{8}{3} \right) \\
 & \quad \quad \quad -\frac{10}{3} - \frac{2}{3} = -\frac{12}{3} = (-4)
 \end{aligned}$$

2. Solve and express your answer in interval notation:  $x^2 - 4x \leq 32$



$$\begin{aligned}
 & \frac{x^2 - 4x - 32}{-32 \quad -32} \leq 0 \\
 & x^2 - 4x - 32 \leq 0 \\
 & (x-8)(x+4) \leq 0 \\
 & x=8 \quad x=-4
 \end{aligned}$$

closed  
GO L I

Interval:  $[-4, 8]$

😊 Guidelines for solving <sup>Rational</sup> ~~nonlinear~~ inequalities: 😊

- Move all terms to one side of the inequality. (If dealing with rational expressions, get a common denominator.)
- Factor completely.
- Set each factor equal to zero. These numbers will divide your number line. (Any denominator critical value has an open circle)
- Make a sign chart by dividing the number line into intervals found in step 3.
- Use a test value to determine the sign in each interval.
- Determine the solution of the inequality by examining the sign values.

For each inequality below, express its solution set 3 ways:

- As a number line.
- Using set-builder notation.
- Using interval notation.

1)  $\frac{x+4}{2-x} \geq 0$  positives

$$\begin{array}{r} x+4=0 \\ -4 \quad -4 \\ \hline x=-4 \end{array} \quad \begin{array}{r} 2-x=0 \\ +x \quad +x \\ \hline 2=x \end{array}$$

critical values

Test  $-5$     $-4$    Test  $0$     $2$    Test  $3$

$\frac{(-)}{(-)}$     $\frac{(+)}{+}$     $\frac{(-)}{(-)}$

$-$     $(+)$     $-$

SB:  $\{x \mid -4 \leq x < 2\}$

Int:  $[-4, 2)$

2)  $\frac{x}{x+2} < 0$  negatives x=0 open

$$\begin{array}{r} x+2=0 \\ x=-2 \end{array} \quad \begin{array}{r} x+2=0 \\ x=-2 \\ \text{open} \end{array}$$

Test  $-3$     $-2$    Test  $-1$     $0$    Test  $100$

$\frac{(-)}{(-)}$     $\frac{(-)}{+}$     $\frac{(+)}{+}$

$+$     $(-)$     $+$

SB:  $\{x \mid -2 < x < 0\}$

Int:  $(-2, 0)$

$$3) \quad \frac{6}{x-3} > 0$$

$$6) \quad \frac{(6-x)(3+x)}{x+1} \leq 0$$

